

International Patent Application No. PCT/DK99/00724

Publication No. WO 00/37751

Icopal A/S

A water vapour barrier and a method of making the same

5 Our ref: 22029 PC 1

New claims, 13 December 2000

- 10 1. A water vapour barrier (15) comprising
a first, water impervious membrane (19) having a plurality of first through openings
(21,28) defined therein,
a second, water impervious membrane (22) arranged opposite to the first
membrane (19),
15 water absorbing material (18) being arranged within one or more spaces being
defined between the first and second membranes (19,22), and
characterised in that at least part of said second membrane (22) is of a material of
the type having a water vapour diffusion resistance, which varies in dependency of the
relative humidity of air in contact therewith, such that the vapour diffusion resistance is
20 reduced when the relative humidity increases, and vice versa.
2. A vapour barrier according to claim 1, wherein a plurality of second through openings
(24,29) are formed in said second membrane (22), and wherein each of said spaces
interconnecting said first openings (21,28) and second openings (24,29).
- 25 3. A vapour barrier according to claim 2, wherein the first through openings (21,28) are
offset to said second through openings (24,29).
4. A vapour barrier according to any of claims 1-3, wherein the first membrane (19) is
30 substantially impervious to water vapour.
5. A vapour barrier according to any of claims 1-4, wherein the first and second
membranes (19,22) are connected to opposite sides of said water absorbing material,
which is in the form of an intermediate layer (18).

35

~~6. A vapour barrier according to claim 5, wherein the second through openings (24,29) cover a substantially larger area of the surface of the water absorbing material than the first through openings (21,28), or vice versa, whereby the vapour transport in the vapour barrier in a direction from the second membrane to the first membrane is predominant, or~~
5 ~~vice versa.~~

6. A vapour barrier according to claim 5, wherein either the second through openings (24,29) cover a substantially larger area of the surface of the water absorbing material than the first through openings (21,28), whereby the vapour transport in the vapour barrier in a direction from the second membrane to the first membrane is predominant, or the first through openings (21,28) cover a substantially larger area of the surface of the water absorbing material than the second through openings (24,29), whereby the vapour transport in the vapour barrier in a direction from the first membrane to the second membrane is predominant.

7. A vapour barrier according to claim 5 or 6, wherein the thickness of the intermediate layer (18) of water absorbing material is 0.2-1.5 mm.

20 8. A vapour barrier according to any of claim 5-7, wherein the intermediate layer (18) of water absorbing material is a fibrous plastic material comprising fibres having a hydrophobic fibre core.

9. A vapour barrier according to any of the preceding claims, wherein the water vapour
25 diffusion resistance of the first membrane (19) is equivalent to 10-100 m air column at any
relative humidity of air in contact therewith.

10. A vapour barrier according to any of the preceding claims, wherein the first membrane is a film or foil (19).

11. A vapour barrier according to any of the preceding claims, wherein the first membrane (19) is made from plastic or metallic material.

12. A vapour barrier according to claim 11, wherein the first membrane (19) is made from
35 polyethylene or polypropylene.

13. A vapour barrier according to claim 12, wherein the first membrane (19) comprises a polyethylene film having a weight of 20-100 g/m², preferably 30-80 g/m².
- 5 14. A vapour barrier according to any of the preceding claims, wherein the water vapour diffusion resistance of the second membrane (22) is equivalent to at least 2 m air column at a relative humidity of 20-50% and less than 1 m air column at a relative humidity of 60-100% of air in contact with the membrane.
- 10 15. A vapour barrier according to claim 14, wherein the water vapour diffusion resistance of the second membrane (22) is equivalent to at least 5 m air column at a relative humidity of 20-50%.
- 15 16. A vapour barrier according to claim 14 or 15, wherein the water vapour diffusion resistance of the second membrane (22) is equivalent to less than 0.5 m air column, preferably about 0.1 m or less, at a relative humidity of 60-100% of air in contact with the membrane.
- 20 17. A vapour barrier according to any of the preceding claims, wherein said at least part of the second membrane (22) is made from at least one material selected from the group consisting of polyamide, ethylene-vinyl alcohol-copolymer, polyvinyl alcohol, polyurethane, protein derivatives, methyl cellulose, cellophane, linseed oil alkyd, and bon glue.
- 25 18. A vapour barrier according to any of the preceding claims, further comprising a moisture distributing outer layer (25) of water absorbing material, which is connected to the outer surface of said first membrane (19) or second membrane (22).
- 30 19. A vapour barrier according to claim 18, wherein the outer layer (25) of water absorbing material is a fibrous, felt-like material.
20. A vapour barrier according to claim 19, wherein the thickness of the outer layer (25) of water absorbing material is less than 0.5 mm, preferably about 0.1 mm.

21. A vapour barrier according to any of the preceding claims, wherein the first membrane (19) is formed by mutually parallel, transversely spaced first bands (20), the first through openings (21) being defined between adjacent first bands (20).

5 22. A vapour barrier according to any of the preceding claims, wherein the second membrane (22) is formed by mutually parallel, transversely spaced second bands (23), the second through openings (24) being defined between adjacent second bands (23).

23. A vapour barrier according to any of the claims 2-22, wherein the minimum spacing
10 between first and second openings (21,24) defined in the first and second membranes (19,22), respectively, is about 20 mm.

24. A vapour barrier according to claim 22, wherein each of said second bands (23) has a width exceeding the width of a corresponding space (21) between adjacent first bands
15 (20) and overlaps said space and adjacent rim portions of said adjacent first bands.

25. A vapour barrier according to claim 24, wherein the maximum transverse overlap of the rim portions of the adjacent first bands (20) is 100 mm.

20 26. A vapour barrier according to claim 25, wherein the maximum transverse overlap is 70 mm.

27. A vapour barrier according to any of the claims 21-26 and being in the form of a web-like material, the parallel, band-shaped openings (21,24) extending in the longitudinal
25 direction of the web-like material.

28. A method of making a water vapour barrier, said method comprising
forming an elongated layer of water absorbing, fibrous material (18),
applying to a first side surface of the layer of water absorbing, fibrous material (18)
30 a plurality of transversely spaced, parallel first bands (20) of a first, water impervious membrane material, and
applying to an opposite, second side surface of the layer of water absorbing, fibrous material (18) a plurality of transversely spaced, parallel second bands (23), at least some of which are of a second membrane material, which is of the type having a wat r

vapour diffusion resistance, which varies in dependency of the relative moisture of air in contact therewith,

each of said second bands (23) having a width exceeding the width of a corresponding space (21) between adjacent first bands (20) and being applied so as to overlap said space and adjacent rim portions of said adjacent first bands.

29. A method according to claim 28, wherein said first membrane material is substantially impervious to water vapour.

30. A method according to claim 28 or 29, wherein at least some of said first and second bands (20,23) are films or foils which are adhered to the side surfaces of the layer of water absorbing fibrous material (18).

31. A method according to claim 29 or 30, wherein the first bands (20) are polyethylene films or foils which are connected to thermoplastic fibres of the layer (18) of water absorbing material by heating and fusing.

32. A method according to any of the claims 28-31, wherein at least some of the second bands (23) are fastened to the layer of water absorbing material (18) by means of a glue.

33. A method according to claim 32, wherein net-like bands of a suitable polymer glue are interposed between said second bands (23) and the layer of water absorbing material (18).